REMARKS

Claims 1-50 are pending in the application. Claims 16-24 and 40-48 are withdrawn in response to the previously imposed restriction requirement as being directed to a nonelected species. Claims 49 and 50 are designated as generic. In the Office Action mailed May 16, 2006, Claims 1-10, 12-15, 25-34, 36-39, 49, and 50 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ekchian et al (U.S. Pat. No. 4,862,160; hereinafter "Ekchian") in view of Appalucci et al. (U.S. Pat. No. 5,841,350; hereinafter "Appalucci"). Claims 11 and 35 are objected to as being dependent upon a rejected base claim, but are indicated as allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims. The Applicants thank the Examiner for the indication of allowable subject matter.

I. Rejections under 35 U.S.C. 103(a)

Claims 1-10, 12-15, 25-34, 36-39, 49, and 50 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ekchian in view of Appalucci. The Applicants respectfully traverse the rejection. As previously discussed, the Applicants' invention differs from the teaching of Ekchian in, among other things, the parameter that the Applicants measure and use in determining the desired property of a set of tags. Ekchian teaches measurement and use of the *strength* (amplitude) of a signal received from a set of tags (Ekchian at least at col. 2, lines 17-21; col. 3, lines 14-25; Figs. 10-13). Ekchian makes the assumption that, for a specific set of tags, the frequency of the signal that will be received can be known in advance (Ekchian at least at col. 3, lines 49-56; col. 4, lines 15-20), and that the amplitude of this received signal will then be proportional to the number of tags generating that signal (the number of tags in the set). In the method of Ekchian, a graph of the amplitude of the received signal is created and a numerical integration under the area of the curve of the graph performed to determine the number of tags in the set (Ekchian at least at col. 5, line 42 to col. 6, line 59).

In contrast, in the Applicants' invention, no assumptions are made about, or arising from, the strength of the received signal from the set of interacting tags. The Applicants do not even measure the amplitude of the received signal from the set of tags. The Applicants further do not

make any assumption that the frequency of the signal generated by the set of interacting tags can be known in advance. Instead, the Applicants measure the frequency of the received signal from the set of interacting tags, whatever it may be, determine the frequency shift of this combined signal in comparison to a reference signal, and then use the frequency shift resulting from the interaction of the set of tags to determine the property of interest (Specification at least at paragraphs [0006], [0034], [0049], [0051], [0056], and [0062] and in Figs. 4, 6, and 8). The Applicants' independent claims 49 and 50 particularly call out that the Applicants' invention utilizes the frequency shift between the measured frequency and the reference frequency in determining the desired parameter with respect to the set of interacting tags.

The Applicants' invention is not obvious over Ekchian in combination with Appalucci or any other art of record, because (1) use of Ekchian in the manner proposed renders Ekchian unsatisfactory for its intended purpose, (2) combination of Ekchian with Appalucci renders Ekchian unsatisfactory for its intended purpose, and (3) combination of Ekchian with Appalucci would change the principle of operation of Ekchian.

The Applicants' invention is not obvious over Ekchian in combination with Appalucci or any other art of record, because use of Ekchian in the manner proposed renders Ekchian unsatisfactory for its intended purpose. As discussed previously, the invention of the Applicants requires measurement of the frequency of the received signal from the set of interacting tags, whatever it may be, determination of the frequency shift of this combined signal in comparison to a reference signal, and then use of the frequency shift resulting from the interaction of the set of tags to determine the property of interest. However, Ekchian requires measurement and use of the strength (amplitude) of the signal received from a set of tags. Ekchian makes the assumption that, for a specific set of tags, the frequency of the signal that will be received can be known in advance, and that the amplitude of this received signal will increase proportionally to the number of tags generating that signal. As described in the accompanying Declaration of Dr. Richard Fletcher, an experiment was performed on July 14, 2006 that replicated earlier experiments and demonstrated that the method of Ekchian does not function as intended when the tags are close together. Documentation of the results obtained from this experiment is attached to the Declaration as Exhibit A.

As shown in Exhibit A, page 1, with one tag, the measured frequency was 8.3 MHz. As shown in Exhibit A, page 2, when a second tag was added on top of the first, the measured combined frequency was *shifted* to 6.7 MHz and the resonance peak amplitude was *decreased*. As shown in Exhibit A, page 3, when a third tag was added on top of the first two, the measured combined frequency was *shifted* to 5.9 MHz and the resonance peak amplitude was further *decreased*. As shown in Exhibit A, page 4, when a fourth tag was added on top of the first three, the measured combined frequency was *shifted* to 5.2 MHz and the resonance peak amplitude was significantly *decreased*. As shown in Exhibit A, page 5, when a fifth tag was added on top of the first four, the measured combined frequency was *shifted* to 4.9 MHz and the resonance peak amplitude was further significantly *decreased*. Exhibit A, page 6 depicts a graph summarizing the relationship between the measured combined frequency and the number of tags. The relationship between the measured combined frequency and the number of tags follows exponential dependence.

As previously discussed, the method of Ekchian calculates the number of tags from the amplitude of the received signal, using the area under the curve. The method requires that the amplitude *increase* in relation to the number of tags present. As can be seen from Exhibit A, when the tags are close together, the amplitude does not increase with an increasing number of tags. Instead, the *received frequency is shifted and the amplitude decreases*. The results discussed in the Declaration of Dr. Fletcher and documented by Exhibit A therefore show that the method of Ekchian does not function as intended when the tags are close together.

The MPEP states at 2143.01(V) that if "the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." The measurement method of Ekchian depends upon the principles that the amplitude always increases in accordance with an increase in the number of tags present, that the frequency of the signal does not change and can be known in advance, and that the degree of proximity of the tags does not affect or change the measurement. As demonstrated by the Exhibit and Dr. Fletcher's Declaration, the amplitude of the received signal does not increase with the number of tags, the frequency does shift, and the degree of proximity of the tags appears to matter, since Ekchian does not function at least when the tags are in close proximity. Because Ekchian fails to work when used as proposed, using

Ekchian in the invention of the Applicants renders the method of Ekchian unsuitable for its intended purpose. For this reason, the use of Ekchian in the manner proposed, including the combination of Ekchian with Appalucci, is not permissible and does not render the invention of the Applicants obvious. Reconsideration and withdrawal of the rejection of claims 1-10, 12-15, 25-34, 36-39, 49, and 50 as being unpatentable over Ekchian in view of Appalucci is therefore respectfully requested.

The Applicants' invention is also not obvious over Ekchian in combination with Appalucci because combination of Ekchian with Appalucci renders Ekchian unsatisfactory for its intended purpose. As discussed previously, and as demonstrated by Exhibit A and Dr. Fletcher's Declaration, Ekchian does not function at least when the tags are in close proximity. Because Ekchian fails to work when used as proposed, using Ekchian in the invention of the Applicants renders the method of Ekchian unsuitable for its intended purpose. Appalucci cannot cure the deficiencies of Ekchian, because Appalucci does not determine or even consider any property of a set of interacting tags, instead showing only a frequency change that is permanently created in a solitary tag for the purpose of activating/deactivating the tag. Appalucci therefore cannot offer any solution to a problem with the teaching of Ekchian that is created by the proximity of more than one resonating tag. Combining Ekchian with Appalucci to obtain the invention of the Applicants would therefore still render the method of Ekchian unsuitable for its intended purpose. For this reason, the combination of Ekchian with Appalucci is not permissible and does not make the invention of the Applicants obvious. Reconsideration and withdrawal of the rejection of claims 1-10, 12-15, 25-34, 36-39, 49, and 50 as being unpatentable over Ekchian in view of Appalucci is therefore respectfully requested.

The Applicants' invention is further not obvious over Ekchian in combination with Appalucci because combination of Ekchian with Appalucci would change the principle of operation of Ekchian. As previously discussed, Ekchian measures only the amplitude of the received signal, not the frequency. Ekchian never calculates or even considers the possibility of a frequency shift. The measurement method of Ekchian depends upon the principles that the amplitude always increases in accordance with an increase in the number of tags present, that the frequency of the signal does not change and can be known in advance, and that the degree of proximity of the tags does not affect or change the measurement. In fact, any change imparted to

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the frequency by the relative proximity of the set of tags would be likely to corrupt the integrity of the data that Ekchian obtains. As demonstrated by Exhibit A, a shift does occur, a shift that Ekchian either was unaware of or chose to ignore.

In contrast, the invention of the Applicants is directed specifically to measurement of the shift between a reference frequency and the measured combined frequency of a set of interacting tags. The amplitude of the signal is never measured. The principles of operation of Ekchian and the Applicants' invention are therefore clearly diametrically opposed- while Ekchian depends on the fact that the frequency remains constant and the amplitude increases, the invention of the Applicants requires that the frequency shift. To use Ekchian in the manner proposed by the rejection would therefore change the principle of operation of Ekchian. As outlined in MPEP 2143.01 (VI), "If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious." For this reason, the combination of Ekchian with Appalucci is not permissible and does not make the invention of the Applicants obvious. Reconsideration and withdrawal of the rejection of claims 1-10, 12-15, 25-34, 36-39, 49, and 50 as being unpatentable over Ekchian in view of Appalucci is therefore respectfully requested.

These deficiencies of Ekchian are not cured by Appalucci. In Appalucci, an individual resonant tag is activated and/or deactivated by means of a permanent mechanical alteration to the tag using an external device [Appalucci at least at col. 2, line 60, to col. 3, line 4; col. 4, line 61, to col. 5, line 17; col. 5, lines 29-41; col. 8, line 56, to col. 9, line10]. The teaching of Appalucci is entirely directed to creating a tag useful in a security system that is designed to detect only activated tags while not detecting deactivated tags [Appalucci at least at col. 4, lines 46-58; col. 5, lines 29-41; col. 5, lines 47-53]. The mechanical alteration of the tag causes a change in the resonant frequency of the tag [Appalucci at least at col. 5, lines 29-41]. It is inherent in the teaching of Appalucci that an important aspect of the scheme is that the resonant frequency of the tag be always maintained within a target range, so that it may consistently be detectable by the security system when activated and not detectable when deactivated.

While Appalucci may arguably employ one form of change in frequency, the frequency change of Appalucci is not the equivalent of the frequency shift quantity of the Applicants'

invention. The Appalucci frequency change has a different function, is created in a different way, and a produces a different result than the frequency shift quantity of the Applicants. As a threshold matter, the frequency of Appalucci is not even the same as the frequency of the Applicants because it is the *frequency of a single tag*, not the *combined frequency obtained from a set of interacting tags* as described and claimed by the Applicants. In fact, the effect of other tags on the subject tag is not even considered by Appalucci, which is fully to be expected since Appalucci is only concerned with the attributes of a solitary tag, not of a group of tags.

Furthermore, in the teaching of Appalucci, the frequency of the tag is never measured; rather, Appalucci just detects the presence or absence of tag transmission within a prespecified range. Given that the frequency is never measured, Appalucci also never determines what the exact change is for a given tag, instead only detecting whether the tag has been activated to/deactivated from the target range.

Furthermore, the frequency change of Appalucci is not same as the frequency shift quantity of the Applicants because they are created in completely different ways. The frequency shift of the Applicants is induced in the group of tags by the proximity of the tag group. It is a temporary, fully-reversible frequency shift, caused by the interaction of signals coming from each tag of the set of tags. In contrast, the frequency change of Appalucci is a permanent change caused by physically and permanently altering an individual tag using a device external to the tag. The effects of any interaction of the tag with other tags is never even considered by Appalucci. The change in frequency taught by Appalucci is not used for the purpose of the Applicants, determining a property of a set of tags, because there is no set of tags, but rather is used only to activate/deactivate a single tag with respect to a detection scheme. The frequency change of Appalucci is a permanent change to the frequency of the tag, a change that cannot be undone, while the individual frequency of each of the Applicants' tags is not actually changed, which is important for their later use as individual markers on items.

Clearly, the teaching of Appalucci contemplates a different definition for the term "frequency shift" than the definition employed by the Applicants. That the term is differently defined by the Applicants is clearly seen in the Applicants' specification, and is embedded into the Applicants' claims by use of the phrase "...of a set of interacting tags". The "measured frequency" of the Applicants is the frequency of a "set of interacting tags", not just of a single

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tag. The measured frequency and frequency shift of the Applicants are therefore not the same quantities used by Appalucci, despite a purely superficial similarity in terminology. It is not sufficient that the term "frequency shift" be found in a reference- the term must represent a quantity that is the equivalent of the quantity employed in the invention of the Applicants. Clearly, that is not the case here.

It is neither plausible nor permissible to simply drop Appalucci's "frequency shift" into the teaching of Ekchian in place of Ekchian's "amplitude" in order to attempt to construct the invention of the Applicants. The frequency change of Appalucci is not the same type of quantity as the combined amplitude of Ekchian and is also not the same type of quantity as the Applicants' "frequency shift". Furthermore, not only does doing so cause Ekchian not to work as intended, using the teaching of Appalucci in the Applicants' invention also would cause Appalucci not to work for its intended purpose, because the frequency shift caused by the interaction of the set of tags would likely cause the frequency of the subject tag to shift out of the target range. This would cause significant problems for the purposes of Appalucci, in that the tag might become undetectable when activated, or might alternatively be detectable when it is intended to be deactivated.

Appalucci does not employ a frequency shift of a set of tags over a reference frequency in order to determine a property of the set of tags. Neither does Ekchian. The Applicants' use of a frequency shift over a reference frequency in order to determine a property of a set of tags is therefore novel and nonobvious in the art. Because Appalucci does not determine, or make use of, a frequency shift parameter as that term is defined by the Applicants, the references of record taken in combination do not show all of the elements of the Applicants' invention. Appalucci therefore fails to anticipate or make obvious the Applicants' invention, whether taken alone or in combination with Ekchian, as does all other art of record. Reconsideration and withdrawal of the rejections of claims 1-10, 12-15, 25-34, 36-39, 49, and 50 as being unpatentable over Ekchian in view of Appalucci is therefore respectfully requested.

The Applicants' invention is also not obvious over Ekchian in combination with Appalucci because (1) the teaching of Appalucci was not reasonably pertinent to the particular problem with which the Applicants were concerned, (2) there was no suggestion or motivation in Ekchian, Appalucci, in any other reference, or in the knowledge generally available to one of

ordinary skill in the art of the Applicants' invention to combine Appalucci with Ekchian, (3) the combination of Ekchian with Appalucci is based on impermissible hindsight based solely on knowledge gleaned from the Applicants' own teaching, and (4) the problem solved by the Applicants' invention was well known and long-felt but, despite the existence of the Ekchian and Appalucci teachings, the art tried and failed to solve the problem.

The Applicants' invention is not obvious over Ekchian in combination with Appalucci or any other art of record, because the teaching of Appalucci was not reasonably pertinent to the particular problem with which the Applicants were concerned. As discussed previously, the invention of the Applicants is directed to determining a property of a set of interacting tags. In contrast, the teaching of Appalucci is directed to an activation/deactivation scheme for a solitary tag. To the extent that Appalucci employs the concept of frequency shift, it is not used for the same purpose as the frequency shift of the Applicants, determining a property of a set of tags, but rather solely as a means to activate and/or deactivate a single tag. The teaching of Appalucci is not in any way concerned with solving the problem of determining a property of a set of tags, as Appalucci never determines any property related to a set of tags. The teaching of Appalucci is therefore not reasonably pertinent to the problem with which the Applicants' invention is concerned.

The MPEP states at 2143.01(I) that the "prior art must suggest the desirability of the claimed invention" and at 2143.01(III) that the "mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." It is therefore not sufficient that the Examiner merely finds the term "frequency shift" in a reference, there must also be a motivation to combine created by the teaching being pertinent to the problem. Such a motivation or suggestion does not exist. For this reason, the combination of Ekchian with Appalucci is not permissible and does not make the invention of the Applicant obvious. Reconsideration and withdrawal of the rejection of claims 1-10, 12-15, 25-34, 36-39, 49, and 50 as being unpatentable over Ekchian in view of Appalucci is therefore respectfully requested.

The Applicants' invention is also not obvious over Ekchian in combination with

Appalucci or any other art of record, because there was no suggestion or motivation in

Appalucci, Ekchian, in any other reference, or in the knowledge generally available to one of

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ordinary skill in the art of the Applicants' invention to combine Appalucci with the other referenced teachings The MPEP states at 2143.01(I) that "obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art."" The "mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination" [MPEP 2143.01(III)].

The Examiner has not cited a single reference in the disclosure of Ekchian or Appalucci as support for the motivation to combine Ekchian with Appalucci, nor has the Examiner pointed to any suggestion or motivation in the knowledge generally available to one of ordinary skill in the art to modify or combine the Ekchian and Appalucci teachings. The fact that both teachings employ resonant tags, taken alone, is not sufficient, as the art in this area is vast and the applications are many. The Appalucci teaching is directed to an activation and deactivation scheme for a solitary tag, while the Ekchian teaching is directed to the determining a property of a group of tags. Further, as discussed previously, the use of Ekchian in the manner proposed would change the principle of operation of Ekchian, and, in fact, causes Ekchian not to function for its intended purpose. For this reason, Ekchian effectively teaches away from the combination of the method of Ekchian with any art showing a "frequency shift", including Appalucci. One would therefore have had no reasonable expectation of success from the combination of Appalucci with the Ekchian for the purposes of the Applicants' invention.

In addition, as previously pointed out by the Applicants, the Muller reference (U.S. Pat. No. 6,639,514) made of record by the Examiner teaches that this frequency shift is known and is the result of an "undesired coupling between two adjacent RFID labels" (Muller at col. 2, lines 40-42), that Muller refers to as "interference caused by other transponders" (Muller at col. 3, lines 34-35). The teaching of Muller is specifically directed to explaining why this "interference" is undesirable (Muller at least at col. 1 line 63 to col. 2, line 55) and to finding ways to prevent it (Muller at least at col. 3, line 33 to col. 4, line 2). Muller therefore particularly teaches away from the invention of the Applicants. One of ordinary skill in the art would simply

not be motivated to make use of the "interference" of Muller in order to determine a property of a set of RFID tags.

There is also no teaching in any of the other art of record that would suggest combination of Appalucci with the teaching of Ekchian. One of ordinary skill in the art of the Applicants' invention would simply not look to the solitary tag activation and deactivation scheme of Appalucci for a solution to the problem of determining a property of a set of tags. Even if one were to look to Appalucci, there would be no reasonable expectation of success from a combination with Ekchian, for the reasons discussed earlier. It is not enough for the Examiner to merely find the term "frequency shift" in a reference and apply it, without the required teaching or motivation. For this reason, the combination of Ekchian with Appalucci is not permissible and does not make the invention of the Applicant obvious. Reconsideration and withdrawal of the rejection of claims 1-10, 12-15, 25-34, 36-39, 49, and 50 as being unpatentable over Ekchian in view of Appalucci is therefore respectfully requested.

The Applicants' invention is also not obvious over Ekchian in combination with Appalucci or any other art of record, because the combination of Ekchian with Appalucci is based on improper hindsight based on knowledge gleaned only from the Applicants' own teaching. The Applicants respectfully submit that the Examiner has combined Ekchian with Appalucci only through hindsight application of the Applicants' own teaching. As previously discussed, there is no teaching anywhere within the art of the Applicants' invention that would lead one to think to make a combination of Ekchian with the Appalucci. Further, there is ample art, such as the Muller reference, that teaches away from the combination. It is insufficient that the Examiner is able to find the term "frequency shift" in the Appalucci reference. Without the Applicants' disclosure, there would have been no motivation for the Examiner to search for any art that employs a frequency shift, because its use for the purposes of the Applicant was unknown before the Applicants' invention. For this reason, the invention of the Applicants is not unpatentable over Ekchian in view of Appalucci or any other art of record. Reconsideration and withdrawal of the rejection of claims 1-10, 12-15, 25-34, 36-39, 49, and 50 as being unpatentable over Ekchian in view of Appalucci is therefore respectfully requested.

The Applicants' invention is also not obvious over Ekchian in combination with

Appalucci or any other art of record, because the problem solved by the Applicants' invention

was well-known and long-felt but, despite the existence of the Ekchian and Appalucci teachings, the art tried and failed to solve the problem. The problem of inventory management, be it of resonant tags or of the items associated with them, is well-known (see, e.g., Ekchian at col. 1). The use of resonant tags has been known for more than two decades (see, e.g., Appalucci at col. 1). The privacy concerns associated with equipping radio frequency inventory tags with individual identification numbers are also well-established (see, e.g., the Applicants' Specification at paragraph [0005]). The art has repeatedly tried and failed to solve the problem solved by the Applicants' invention. As discussed previously, there was no reasonable expectation that the combination of Appalucci with Ekchian would solve this long-felt problem. For this reason, the combination of Ekchian with Appalucci does not make the invention of the Applicant obvious. Reconsideration and withdrawal of the rejection of claims 1-10, 12-15, 25-34, 36-39, 49, and 50 as being unpatentable over Ekchian in view of Appalucci is therefore respectfully requested.

For at least the foregoing reasons, the Ekchian reference may not be used as the basis for a rejection. In the absence of Ekchian, the deficiencies of Appalucci are not cured by any other art of record. The pending claims are therefore not obvious over any combination of any art of record. Reconsideration and withdrawal of the rejection of claims 1-10, 12-15, 25-34, 36-39, 49, and 50 as being unpatentable over Ekchian in view of Appalucci is therefore respectfully requested. Further, because claims 1-10 and 12-15 depend from independent claim 49, which is not unpatentable over Ekchian in view of Appalucci and is in condition for allowance, claims 1-10 and 12-15 are also in condition for allowance. Reconsideration and withdrawal of the rejection of claims 1-10 and 12-15 is therefore respectfully requested. Similarly, because claims 25-34 and 36-39 depend from independent claim 50, which is not unpatentable over Ekchian in view of Appalucci and is in condition for allowance, claims 25-34 and 36-39 are also in condition for allowance. Reconsideration and withdrawal of the rejection of claims 25-34 and 36-39 is therefore respectfully requested. Because claims 11 and 35 depend from independent claims 49 and 50, respectively, which are not unpatentable over Ekchian in view of Appalucci and are in condition for allowance, claims 11 and 35 are also in condition for allowance. Reconsideration and withdrawal of the objections to claims 11 and 35 is therefore respectfully requested.

November 16, 2006

Date

Response to 5/16/2006 Office Action U.S. App. Ser. No. 10/625789 Attorney Docket: 056754/0124941

II. Conclusion

The Applicants respectfully submit that claims 1-15, 25-39, 49, and 50 are now in condition for allowance, which action is therefore requested. Due to the impending expiration of the time for reply, a Notice of Appeal is being submitted with this response in order to keep the application pending while the Examiner considers the Applicants' response. Should there remain any unresolved issues, it is respectfully requested that the Examiner telephone Norma E. Henderson, Applicants' Attorney, at 603-437-4400, so that such issues may be resolved as expeditiously as possible.

Respectfully Submitted,

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